MATH-IMS Joint Colloquium Series
The Chinese University of Hong Kong

This MATH-IMS Joint Colloquium Series in pure mathematics is organized by the Department of Mathematics and the Institute of Mathematical Sciences (IMS) at the Chinese University of Hong Kong. The series focus on all areas of pure mathematics together with theoretical developments and applications.

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Zoom Link: https://cuhk.zoom.us/j/98846779826

Unitary Representations of 3-manifold Groups and the Atiyah-Floer Conjecture

Speaker: Professor Aliakbar Daemi
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Abstract: A useful tool to study a 3-manifold is the space of the representations of its fundamental group, a.k.a. the 3-manifold group, into a Lie group. Any 3-manifold can be decomposed as the union of two handlebodies. Thus, representations of the 3-manifold group into a Lie group can be obtained by intersecting representation varieties of the two handlebodies. Casson utilized this observation to define his celebrated invariant. Later Taubes introduced an alternative approach to define Casson invariant using more geometric objects. By building on Taubes' work, Floer refined Casson invariant into a graded vector space whose Euler characteristic is twice the Casson invariant. The Atiyah-Floer conjecture states that Casson's original approach can be also used to define a graded vector space and the resulting invariant of 3-manifolds is isomorphic to Floer's theory. In this talk, after giving some background, I will give an exposition of what is known about the Atiyah-Floer conjecture and discuss some recent progress, which is based on a joint work with Kenji Fukaya and Maksim Lipyanskyi. I will only assume a basic background in algebraic topology and geometry.

Bio: Prof. Aliakbar Daemi obtained his PhD degree from Harvard University under the supervision of Prof. Kronheimer. He held positions at Columbia University, Simons Center for Geometry and Physics, before moving to Washington University in St. Louis as an Assistant Professor.